Catoctin Creek Water Quality Implementation Plan (Fecal Coliform TMDLs)

Executive Summary

Submitted to
The Stakeholders of
Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek, and Catoctin Creek Watersheds

On Behalf of
The Commonwealth of Virginia:
Department of Conservation and Recreation
and
Department of Environmental Quality

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Also available for this project:
The Catoctin Creek Water Quality Implementation Plan (Fecal Coliform TMDLs) Technical Report and Implementation Work-book

Introduction

Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek and main stem Catoctin Creek were placed on the 1998 List of Impaired Waters because of exceedances for the fecal coliform (FC) bacteria water quality standard. In addition, in 2004 3.4 miles of Upper South Fork Catoctin Creek was listed as impaired for exceedances of the General Standard (benthic) for not supporting aquatic life. After the FC listing, TMDLs were developed for each impairment. TMDL is an acronym for Total Maximum Daily Load, which is the maximum amount of pollutant that a water body can assimilate without surpassing the state water quality standard. If the water body surpasses the water quality standard 10% of the time during an assessment period, the water body is placed on the Commonwealth of Virginia's 303(d) List. After TMDL Plans are written, Virginia's 1997 Water Quality Monitoring Information and Restoration Act states in section 62.1-44.19:7 that the "Board shall develop and implement a plan to achieve fully supporting status for impaired waters". In fulfilling the state's requirement for the development of a TMDL Implementation Plan, a framework was established for reducing FC and achieving the water quality goals for which TMDL allocations were developed. With successful completion of the implementation plan, the Catoctin Creek watershed will be well on the way to having "clean" streams and land and water resources will be enhanced. Additionally, development of an approved implementation plan will improve the localities chances for obtaining monetary assistance during implementation.

Key components of the implementation plan are discussed in the following sections:

- ◄ Review of the TMDL Development Study;
- ◄ Process for Public Participation
- ◄ Assessment of Needs;
- ◄ Cost/Benefit Analysis; and
- ◄ Implementation.

It has been documented time and again the detrimental effects of bacteria in food and water supplies. For example, August 8, 1994, Virginia Department of Health (VDH) notified of campers and counselors at a Shenandoah Valley summer camp developing bloody diar-

rhea. *E. coli* 0157:H7 was confirmed as the causative agent. In Franklin County Virginia, 1997 an outbreak of illnesses involving 3 children was attributed to *E. coli* (0157:H7) in Smith Mountain Lake. The children were exposed to the bacteria while swimming in the lake and a two year old hospitalized, almost died as a result of the exposure (Roanoke Times, 1997). In August of 1998, 7 children and 2 adults at a day-care center in rural Floyd County were infected with *E. coli* (0157:H7). Upon investigation, two of the properties' wells tested positive for total coliform (Roanoke Times, 1998). On June 6, 2000, Crystal Spring, Roanoke Virginia's second largest water source was shut down by VDH for *E. coli* contamination.

Isolated cases? No. Throughout the U. S., the Center for Disease Control estimates at least 73,000 cases of illnesses and 61 deaths per year are caused by this one fecal coliform pathogen (*i.e., E. coli* 0157:H7 bacteria) (CDC, 2001). Other fecal coliform pathogens (*e.g., E. coli* 0111) are responsible for similar illnesses. In addition , other bacterial and viral pathogens are indicated by the presence of fecal coliforms. Whether the source of contamination is human or livestock the threat of these pathogens appears more prevalent as both populations increase. As stakeholders we must assess the risk we are willing to accept and then implement measures to safeguard the public from these risks. Water quality standards are society's implementation of legislative measures resulting from an assessment of the acceptable risks.

This booklet is an abbreviated version of the full plan, which can be obtained by contacting DEQ or DCR offices.

Review of TMDL Development Plan

The Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek, and Catoctin Creek are part of the Catoctin Creek watershed, located in Loudoun County, Virginia, just north of Purcellville and approximately five miles to the northwest of Leesburg, Virginia (Figure 1).

The total area of the Catoctin Creek watershed is approximately 59,000 acres, with forest and agriculture as the primary landuses. The Upper South Fork Catoctin watershed is approximately 14,000 acres comprised of forest (24.3%), agricultural (70.2%), urban (4.8%) and water (0.7%) landuses. Similarly, the 7,000 acres in the Lower South Fork Catoctin

Creek watershed are distributed between forest (23.6%), agricultural (73.3%), urban (2.4%) and water (0.7%) landuses. The total area of the North Fork Catoctin Creek watershed is approximately 15,000 acres comprised of forest (41.0%), agricultural (57.6%), urban (0.6%) and water (0.8%) landuses. The main stem Catoctin Creek watershed is approximately 23,000 acres comprised of forest (30.1%), agricultural (67.7%), urban (1.1%), and water (1.1%) landuses. The estimated human population within the Catoctin Creek drainage area in 2001 was 9,757.

Recommendations made in the TMDL included:

- All livestock must be excluded from streams within all impairments;
- All straight pipes must be identified and corrected within all impairments;
- Implicit in the requirement for correction of straight pipes is the need to maintain all functional septic systems;
- Reduce wildlife direct deposition in Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek, and Catoctin Creek by 91%, 25%, 93%, and 85% respectively; and
- Human-induced FC sources will be addressed in phased implementation of the IP, setting aside any reduction of wildlife. The VADEQ will re-assess streams to determine if water quality standards have been attained.

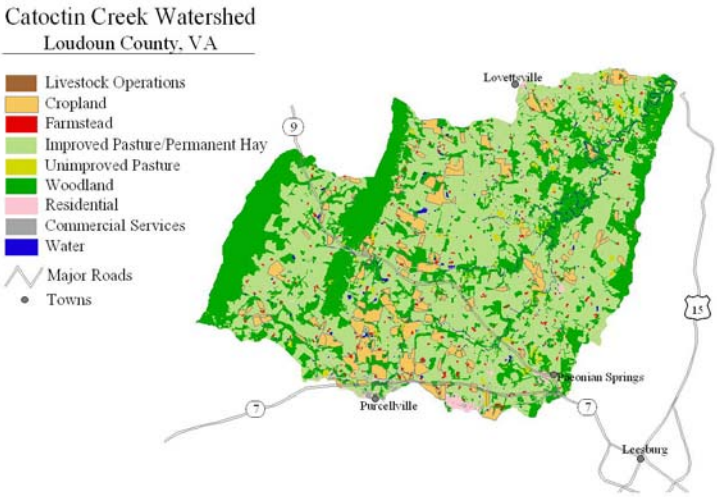


Figure 1 Landuses in the Catoctin Creek Watershed.

Process for Public Participation

The actions and commitments described in this document are drawn together through input from citizens of the watersheds, the Loudoun County government, Virginia Department of Conservation and Recreation (VADCR), Virginia Department of Environmental Quality (VADEQ), Virginia Department of Health (VDH), Virginia Cooperative Extension (VCE), Natural Resources Conservation Service (NRCS), Loudoun Soil and Water Conservation District (LSWCD), and MapTech, Inc. Every citizen and interested party in the watersheds is encouraged to become involved in implementing the IP and contributing what they are able to help restore the health of the streams.

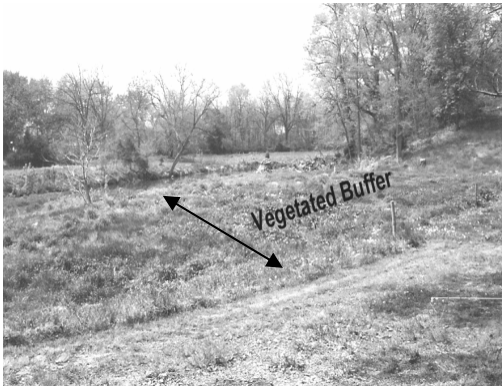
Public participation took place on three levels. First, public meetings were held to provide an opportunity for informing the public as to the end goals and status of the project, as well as, a forum for soliciting participation in the smaller, more targeted meetings (*i.e.,* working groups and steering committee). Second, working groups were assembled from communities of people with common concerns regarding the implementation process. These were the primary arena for public input. Working

groups consisted of the following: Agricultural, Residential, Environmental, and Governmental. A representative from VADCR or MapTech attended each working group in order to facilitate the process and integrate information collected from the various communities. Third, a steering committee was formed with representation from all the working groups, VADCR, VADEQ, LSWCD, VDH, VCE, Loudoun Watershed Watch, Lovettsville Farm Club, Farm Bureau, Catoctin Farm Club, Hillsboro Ruritan Club, local governments and MapTech, and had the expressed purpose of guiding the development of the IP. Over 390 man-hours were devoted to attending these meetings by individuals representing agricultural, residential, commercial, environmental, and government interests on a local, state, and federal level.

Throughout the public participation process, major emphasis was placed on discussing best management practices (BMPs), BMP specifications, locations of control measures, education, technical assistance, and funding.

Working Groups and Steering Committee

The Agricultural Working group (AWG) consisted predominantly of beef producers and horse owners throughout the watershed. The AWG decided that the Conservation Reserve and Enhancement Program (CREP) and grazing land protection system (SL-6) were the most promising programs/practices for beef operations in the watershed, while stream protection (WP-2) may be appropriate for some horse owners. For small acreages, the small acreage grazing land protection system (SL-6A) may be appropriate. The stream protection without fencing (SL-6B) practice was generally viewed as a less attractive option, given that streamside fencing may still be required at some point in the future. The total cost of livestock exclusion systems includes not only the costs associated with fence in-



stallation, repair, and maintenance, but also the cost of taking land (35-ft buffer area) out of production. It was stated that small farms cannot afford this loss of land. With an aging farmer population and these constraints, farmers may retire rather than participate in BMP programs. The AWG agreed this would have negative impacts on water quality. Incentives for installing BMPs include a 25% tax credit for fence maintenance and conservation easements where the landowner is paid a percentage of the land value to leave it undisturbed. It was noted that IP participation is not currently mandatory, but might become mandatory later. Waiting for regulations to force IP compliance was not the best action because funding is available now.

The purpose of the Environmental Working group (EWG) was to identify funding sources/partnerships that will promote the IP, identify complimentary monitoring programs, and review implementation strategies from an environmental perspective. The EWG agreed that IP monitoring should be expanded beyond the ambient monitoring provided by DEQ, and should be integrated into the monitoring plans and programs of LSWCD, the county, and LWW. Stakeholders should continue to pursue additional monitoring resources in carrying out the IP. Funding for implementation of the IP should be used for BMPs, technical assistance, education, and monitoring. The need for a coordinator who could organize local citizens to get involved, provide monitoring, cleanup, education, restoration, and writing grants for funding was discussed. Varied opinions were voiced throughout the public participation regarding the IP process. A need to clarify the problem to the public through education was a concern. Most participants agreed that the cornerstone of the IP is cultivating public involvement and education, and encouraging commitment and partnerships among the citizens and government agencies in the watershed in order to reduce fecal bacteria pollution. An assertion to individual responsibility provides a foundation for building partnerships among citizens, businesses, interest groups, and government agencies. It can also cultivate voluntary implementation and long-term support for reducing bacteria levels and restoring water quality in the Catoctin Creek watershed.

The Governmental Working group (GWG) contained members from the Loudoun County government, VADCR, VADEQ, NRCS, LSWCD, EPA, VDH, and VCE. The NRCS will provide financial

and technical assistance through the Environmental Quality Incentives Program (EQIP), and the Wildlife Incentive Program (WHIP). The LSWCD will provide financial and technical assistance to farmers through the Virginia Agricultural BMP Cost-Share and Tax Credit Programs. Loudoun County staff can assist with public outreach. The DEQ is currently on a two-year intensive monitoring cycle in the Catoctin Creek watershed. The Health Department will assist in locating straight pipes. The group identified technical and financial resources currently in place that could support implementation and identified legal and regulatory controls to facilitate such participation.

The purpose of the Residential Working group (RWG) was to develop a plan to (1) identify and eliminate straight pipes of wastewater from dwellings and businesses, (2) recognize difficulties faced by landowners in correcting these problems, (3) identify potential means of funding corrections, (4) determine how to get landowners to come forward when there is fear of regulatory action and unknown costs, (5) determine technical assistance needs, (6) determine educational tools that are most likely to help. Funding sources and the fact that people do not want the government telling them what to do were identified as obstacles to implementation. The RWG decided the best way to overcome these issues is through non-governmental group participation, education, amnesty from prosecution with voluntary actions, and financial assistance. The group identified that education can be by press releases, advertisements, newspaper articles, and mailings. The RWG decided the best way to identify straight pipe locations is with stream walks.

The Steering Committee consisted of representatives from the Agricultural, Residential, Environmental, and Governmental Working groups, VADCR, VADEQ, LSWCD, VDH, local government agencies and MapTech. The Steering Committee discussed how to get more participation from producers, how monitoring can help implementation, and potential funding resources available.

Assessment of Needs

The quantity of control measures, or BMPs, required during implementation was determined through spatial analyses of landuse, stream-network, elevation, building locations, and Loudoun County's Pollutant Source Database along with regionally appropriate data archived in the DCR Agricultural BMP Database and TMDL develop-

ment documents. The map layers and archived data were combined to establish high and low estimates of control measures required overall, in each watershed, and in each subwatershed. Additionally, input from local agency representatives and contractors were used to verify the analyses. Estimates of control practices needed for full implementation in the four watersheds are listed in Table 1.

There are approximately 269 miles of perennial and intermittent stream in the four watersheds. The length fencing required on perennial streams on the Catoctin Creek watershed is approximately 32 miles of fence. There are 126 full livestock exclusion systems, consisting of 83 cattle exclusion systems and 43 equine exclusion systems, needed to be implemented to insure full exclusion of livestock from the streams.

Table 1 Estimation of average control measures with unit cost needed during implementation for agricultural and resi dential programs in Upper South Fork Catoctin, Lower South Fork Catoctin, North Fork Catoctin, and Catoctin Creek Watersheds.

Control Measure	Unit	Estimated Unit Needs	Average Cost/Unit ($)
Agricultural Program			
Full Exclusion System for livestock	system	83	7,069
Full Exclusion System for horses	system	43	3,595
Hardened Crossing	system	76	2,000
Technical Assistance	man-year	5	50,000
Administrative Assistance[1, 2]	man-year	0	35,000
Residential Program			
Septic System	system	10	7,000
Alternative Waste Treatment System	system	10	36,000
Technical Assistance	man-year	2.5	50,000
Administrative Assistance[1]	man-year	0	35,000

[1]It was assumed that the Technical Assistant can do his/her administrative work.
[2] The number of Technical FTE was rounded up to account for administration work.

The IP focuses on fencing livestock from perennial streams because the TMDL report showed that more violations of the FC standard occurred during dry conditions. It is assumed intermittent streams will be dry during these periods.

In discussion with the Steering Committee and Residential Working Group, it was decided that budgeting should be based on correcting 20

straight pipes. The number and location of straight pipes were based, initially on eight reported in the TMDL. In Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek, and Catoctin Creek 7, 3, 4, and 6 straight pipes, respectively, were distributed between subwatesheds. All straight pipes must be identified and replaced during implementation since a 100% load reduction from straight pipes was deemed necessary to meet the TMDL goal.

To determine the number of full time equivalents (FTE) considered necessary for agricultural technical assistance during implementation, the total practices needed to be installed per year during implementation was divided by the number of BMPs that a FTE can process in a year. In determining the maximum needed technical assistance, it was assumed that all practices would need some level of technical assistance. The number of FTE required was calculated from knowing that 2 FTEs can install 118,724 ft of fence for livestock exclusion systems (SL-6) and 121,778 ft for horse exclusion systems (WP-2) in 5 years. As a result, 1 agricultural technical FTE and one-half residential technical FTE are needed to provide technical assistance throughout the Catoctin Creek implementation plan.

Implementation

Potential funding sources available during implementation were identified during plan development. Detailed description of each source can be obtained from the LSWCD, VADCR, NRCS, VCE, and VADEQ. Sources include:

- Federal Clean Water Act Section 319 Increment Funds
- Virginia Agricultural Best Management Practices Cost-Share Program
- Virginia Agricultural Best Management Practices Tax Credit Program
- USDA Environmental Quality Incentives Program (EQIP)

- Virginia Revolving Loan Programs (Agricultural BMPs and on-site sewage disposal systems)
- USDA Wildlife Habitat Incentive Program (WHIP)
- Virginia Water Quality Improvement Fund

One possible scenario for funding in the first year is presented in Table 3. This scenario represents 20% installation of needed agricultural systems addressing livestock exclusion (*i.e.,* full livestock exclusion system, and hardened crossings), 20% of straight pipes replaced (*i.e.,* 50% with septic system and 50% with alternative system), 1 agricultural technical man-years, and 0.5 residential technical man-years.

Table 3 One possible scenario for funding in the first year.

Funding Source	Agricultural ($)	Residential ($)	Total ($)
319 Incremental Funds			
Practices	122,[1]000	0	**122,000**
Technical Assistance	50,000	25,000	**75,000**
Cost-Share[1]	0	49,000	**49,000**
Landowner	60,000	37,000	**97,000**
Total[2]	232,000	111,000	**344,000**

[1]25% tax credit and other programs available.
[2]Grand Total rounded to nearest $1,000.

Progress toward end goals will be assessed during implementation through tracking of control measure installations by LSWCD, VDH and VADCR and continued water quality monitoring to be conducted by VADEQ. Additionally, Loudoun Watershed Watch has developed a monitoring plan to supplement VADEQ's monitoring and data to assess implementation progress.

Implementation is scheduled to begin in August 2004 after which five milestones need to be met over the next five years (Figure 4). The first milestone will be one year after implementation begins, whereby 20% of the livestock exclusion systems and 20% of the residential

control measures will be installed with a 3% to 10% expected reduction in exceedances of the geometric mean FC water quality standard. After five years from the start of implementation, 100% of the livestock exclusion systems will be installed and 100% of straight pipes corrected resulting in a 71% to 78% anticipated reduction in FC standard exceedances.

The final milestone will be de-listing of the impaired segments from the 303(d) list, which is anticipated by 2014. Based on meeting the above milestones, a five-year implementation plan outline was formulated as depicted in Tables 5 and 6.

Table 4 **Implementation and water quality milestones (*i.e.*, estimation of FC geometric mean water quality standard exceedances) in Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek, and Catoctin Creek Watersheds.**

Mile-stone	Date	Implementation Milestone	Water Quality Milestone: FC geometric mean water quality exceedances in			
			Upper South Fork Catoctin Creek (%)	Lower South Fork Catoctin Creek (%)	North Fork Catoctin Creek (%)	Catoctin Creek (%)
Existing	8/1/2004	Implementation Begins	33	20	34	17
1	8/1/2005	20% Implementation	32	18	32	16
2	8/1/2006	40% Implementation	29	16	30	14
3	8/1/2007	60% Implementation	24	14	25	13
4	8/1/2008	80% Implementation	16	11	17	10
5	8/1/2009	100% Implementation	6	5	8	5
6	8/1/2014	De-listing from 303(d) List	0	0	0	0

Implicit in the process of a staged implementation is targeting of control measures. Targeting ensures optimum utilization of resources. Targeting of critical areas for BMP installation was accomplished through analysis of landuse, farm boundaries, stream network GIS layers, and monitoring results. Monitored data collected during the development process was used together with spatial analysis results to identify subwatersheds where initial implementation resources would result in the greatest return in water quality improvement.

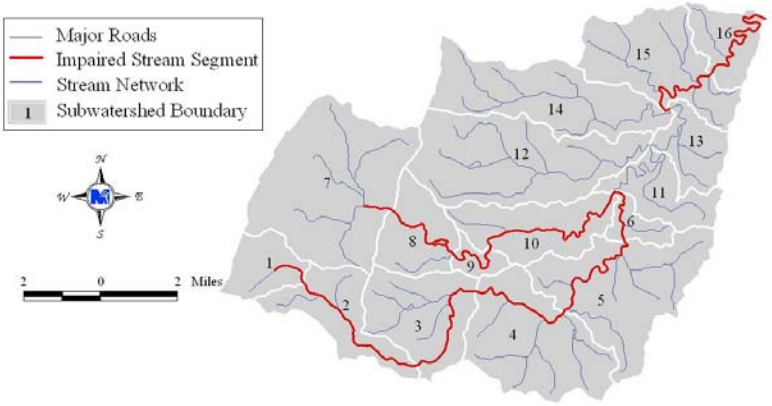


Figure 2 Catoctin Creek impaired segments and subwatersheds.

If feasible, effort should be made to concentrate resources first in the following subwatersheds: 1, 2, 4, 7, 8, 11, 12, 13, 14, and 16 (see Figure 3). These subwatersheds had the greatest animals per length of fenced needed ratios. Spatial analysis was performed to identify land parcels next to a stream with buildings not know to have a wastewater treatment system. These land parcels have the potential for straight pipes. Using these results, efforts can be made to contact identified residents first during implementation to address straight pipes.

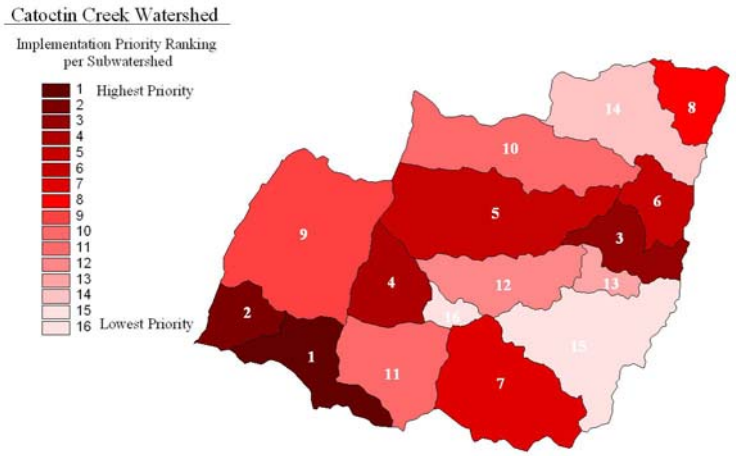


Figure 3 Catoctin Creek subwatershed by Implementation Priority Ranking

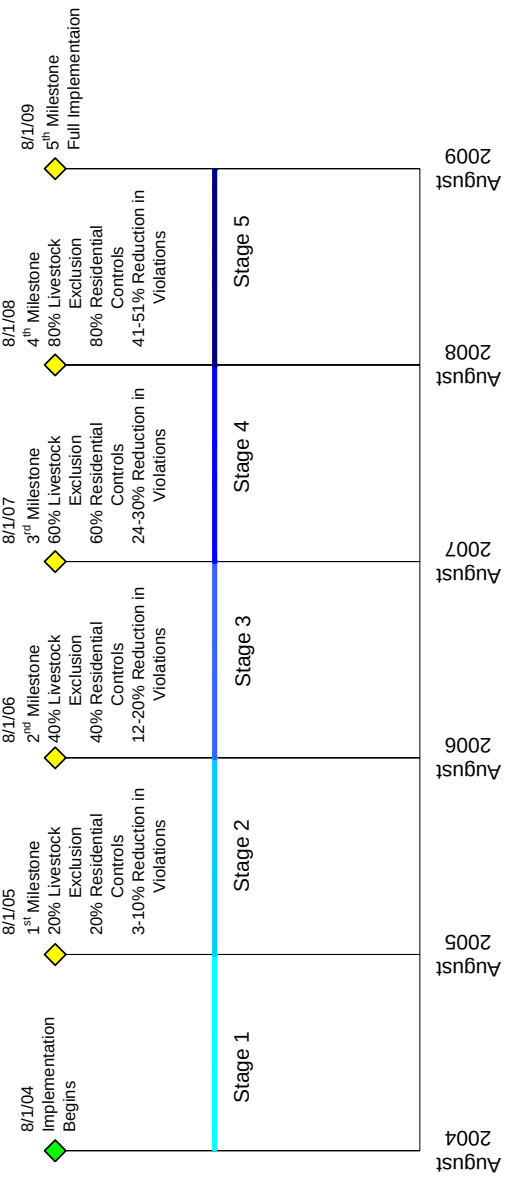


Figure 4 Implementation milestones for Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek and Catoctin Creek.

Table 5 **Percentage of practices to be installed addressing livestock exclusion and straight pipes with amount of technical assistance needed in Upper South Fork Catoctin, Lower South Fork Catoctin, North Fork Catoctin, and Catoctin Creek Watersheds.**

Date	Livestock Exclusion	Straight Pipes	Agricultural	Residential
(year)	(%)	(%)	*Technical Assistance (FTE)*	*Technical Assistance (FTE)*
1	20	20	1	0.5
2	20	20	1	0.5
3	20	20	1	0.5
4	20	20	1	0.5
5	20	20	1	0.5
Total	**100**	**100**	**5**	**2.5**

Table 6 **Cost associated with percentage of practices installed addressing livestock exclusion and straight pipes with technical assistance needed in Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek and Catoctin Creek**

Date (year)	Livestock Exclusion ($)	Straight Pipes ($)	Agricultural Assistance *Technical* ($)	Residential Assistance *Technical* ($)	Estimated Total Cost Per Year ($)
1	182,519	86,000	50,000	25,000	344,000
2	182,519	86,000	50,000	25,000	344,000
3	182,519	86,000	50,000	25,000	344,000
4	182,519	86,000	50,000	25,000	344,000
5	182,519	86,000	50,000	25,000	344,0000
Total	**913,000**	**430,000**	**250,000**	**125,000**	**1,718,000**

Cost / Benefit Analysis

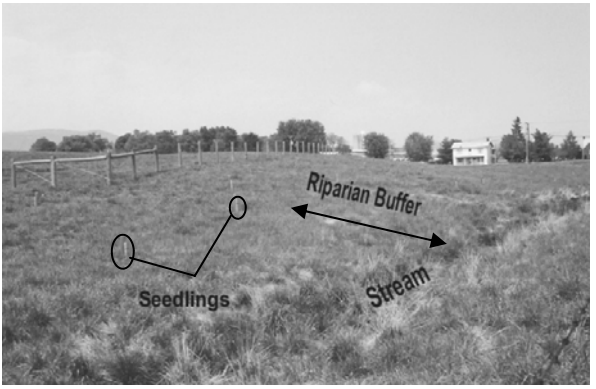
Associated cost estimations of systems needed for full livestock exclusion reductions were calculated by multiplying the unit cost per the number of units in each subwatershed (Table 1). As depicted in Table 3, the amount needed to install control measures that will ensure full livestock exclusion from streams in the watersheds is $913,000 excluding technical assistance.

Cost estimations to replace identified straight pipes were based on the combination of new septic systems or alternative waste treatment system. Without site surveys at each location where system replacement/ installation is required, it is difficult to determine the proportion of sites needing alternative systems. In this light, it was assumed that sites were evenly split between needing standard systems (*i.e.,* septic systems) and alternative systems (*e.g.,* peat moss filter systems). The total cost estimated for replacement/installation of private sewage systems was $430,000.

It was determined by the LSWCD, VADCR, VDH, and Steering Committee members that it would require $50,000 and $35,000 to support the salary, benefits, travel, training, and incidentals for education of one technical FTE and administrative FTE, respectively. With quantification analysis yielding a need for 1 technical FTE and 0 administrative FTE, the total cost to provide agricultural technical assistance during implementation is expected to be $250,000 (Table 2). For residential technical assistance, approximately $125,000 is needed to support one-half technical FTE (Table 2).

Table 2 Estimated total implementation cost for agricultural BMPs, residential BMPs, and technical assistance in Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek and Cat toctin Creek Watersheds.

Implementation Needs	Average Total Cost ($)
Livestock Exclusion BMPs	913,000
Residential BMPs	430,000
Technical Assistance	
Agricultural Programs	250,000
Residential Programs	125,000
Total	**1,718,000**



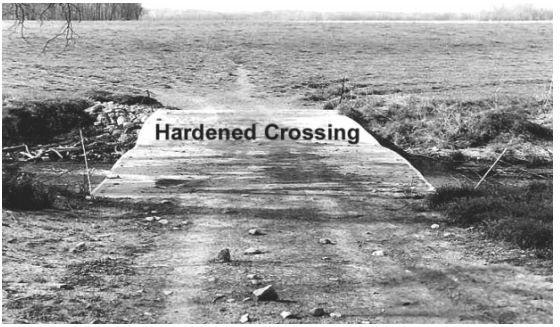
The primary benefit of implementation is cleaner waters in Virginia. Specifically, fecal contamination in Upper South Fork Catoctin Creek, Lower South Fork Catoctin Creek, North Fork Catoctin Creek and Catoctin Creek will be reduced to meet water quality standards. It is hard to gage the impact that reducing fecal contamination will have on public health, as most cases of waterborne infection are not reported or are falsely attributed to other sources. However, because of the reductions required, the incidence of infection from fecal sources, through contact with surface waters, should be reduced considerably. Additionally, because of streambank protection that will be provided through exclusion of

livestock from streams the aquatic habitat will be improved and progress will be made toward reaching future TMDLs—*e.g.,* General Standard (benthic) in these waters. The vegetated buffers that are established will also serve to reduce sediment and nutrient transport to the stream from upslope locations. In areas where pasture management is improved through implementation of grazing-land protection BMPs, soil and nutrient losses should be reduced, and infiltration of precipitation should be increased, decreasing peak flows downstream.

An important objective of the implementation plan is to foster continued economic vitality and strength. This objective is based on the recognition that healthy waters improve economic opportunities for Virginians and a healthy economic base provides the resources and funding necessary to pursue restoration and enhancement activities. The agricultural and residential practices recommended in this document will provide economic benefits to the landowner, as well as, the expected environmental benefits. Specifically, alternative (clean) water sources, exclusion of livestock from streams, intensive pasture management, and private sewage system maintenance will each provide economic benefits.

A clean water source has been shown to improve weight gain and milk production in cattle. Fresh clean water is the primary nutrient for livestock with healthy cattle consuming, on a daily basis, close to 10% of their body weight during winter and 15% of their body weight in summer. Many livestock illnesses can be spread through contaminated water supplies. For instance, coccidia can be delivered through feed, water and haircoat contamination with manure (VCE, 2000). In addition, horses drinking from marshy areas or areas where wildlife or cattle carrying Leptospirosis have access tend to have an increased incidence of moonblindness associated with Leptospirosis infections (VCE, 1998b). A clean water source can prevent illnesses that reduce pro-

duction and incur the added expense of avoidable veterinary bills. In addition to reducing the likelihood of animals contracting waterborne illnesses by providing a clean water supply, streamside fencing excludes livestock from wet, swampy environments as are often found next to streams where cattle have regular access. Keeping cattle in clean dry areas has been shown to reduce the occurrence of mastitis and foot rot. The Virginia Cooperative Extension (1998a) reports that mastitis currently costs producers $100 per cow in reduced quantity and quality of milk produced. On a larger scale, mastitis costs the U.S. dairy industry about $1.7-2 billion annually or 11% of total U.S. milk production. While the spread of mastitis through a dairy heard can be reduced through proper sanitation of milking equipment, mastitis-causing bacteria can be harbored and spread in the environment where cattle have access to wet and dirty areas. Implementation of streamside fencing and well managed loafing areas will reduce the amount of time that cattle have access to these areas.



Taking the opportunity to initiate an improved pasture management system in conjunction with installing clean water supplies

will also provide economic benefits for the producer. Improved pasture management can allow a producer to feed less hay in winter months, increase stocking rates by 30 - 40%, and consequently, improve the profitability of the operation. With feed costs typically responsible for 70-80 percent of the cost of growing or maintaining an animal, and pastures providing feed at a cost of 0.01-0.02 cents/lb of total digestible nutrients (TDN) compared to 0.04-0.06 cents/lb TDN for hay, increasing the amount of time that cattle are fed on pasture is clearly a financial benefit to producers (VCE, 1996). Standing forage utilized directly by the grazing animal is always less costly and of higher quality than the same forage harvested with equipment and fed to the animal. In addition to reducing costs to producers, intensive pasture management can boost profits, by allowing higher stocking rates and increasing the amount of gain per acre. A side benefit is that cattle are more closely confined allowing for quicker checking and handling. In general, many of the agricultural BMPs being recommended will provide both environmental benefits and economic benefits to the farmer.

The residential programs will play an important role in improving water quality, since human waste can carry with it human viruses in addition to the bacterial and protozoan pathogens that all fecal matter can potentially carry with it. In terms of economic benefits to homeowners, an improved understanding of private sewage systems, including knowledge of what steps can be taken to keep them functioning properly and the need for regular maintenance, will give homeowners the tools needed for extending the life of their systems and reducing the overall cost of ownership. The average septic system will last 20-25 years if properly maintained. Proper maintenance includes: knowing the location of the system components and protecting them by not driving or parking on top of them, and not planting trees where roots could damage the system, keeping hazardous chemicals out of the system, and pumping out the septic tank every three to five years. The cost of proper maintenance, as outlined here, is relatively inexpensive in comparison to repairing or replacing the entire system. Additionally, the repair/replacement program will benefit owners of private sewage (*e.g.,* septic) systems, particularly low-income homeowners, by sharing the cost of required maintenance.

Monitoring

The only monitoring that is currently funded is performed by VADEQ. A local watershed group, Loudoun Watershed Watch (LWW), has developed a complementary monitoring plan for Catoctin Creek and will seek funding. This plan was developed to better define implementation progress. Specifics about the role of citizens monitoring in Catoctin Creek is provided in Appendix A of the Technical Report.

Education

Three organizations will be involved in public education, LWW, VCE, and LSWCD. The LWW, a citizen based group, will seek funding to implement a public participation and education plan targeting the local watershed communities. The LWW plan includes a "Catoctin Watershed Day" with BMP tours, watershed stewardship demonstrations, and a watershed clean-up activity. If funding is obtained, they also plan to provide a monthly emailed newsletter, display posters at local businesses, and information about restoring Catoctin Creek at local events. The LWW website is kept current at www.loudounwatershedwatch.org.

The VCE responds to the needs of individuals, families, groups and organizations with educational programs. Citizens of Virginia can participate through their local extension office.

The LSWCD will be in charge of initiating contact with farmers in the Catoctin Creek watershed to encourage the installation of cattle and horse exclusion systems. This one-on-one contact will facilitate communication of the water quality problems and the corrective actions needed. The LSWCD will conduct a number of outreach activities in the watershed to promote participation and community support to obtain the agricultural program milestones and to make the agricultural community aware of the TMDL requirements. Such activities will include information exchange through a newsletter, mailings, field days, organizational meetings, etc.

The Catoctin Creek water quality IP website is kept current at: www.loudoun.gov/envhist/catoctin.htm.

Stakeholder's Roles and Responsibilities

Achieving the goals of this effort (*i.e.,* improving water quality and removing these waters from the impaired waters lists) is without a doubt dependent on stakeholder participation. Not only the local stakeholders charged with implementation of control measures, but also the stakeholders charged with overseeing our nation's human health and environmental programs must first acknowledge there is a water quality problem and then make changes as needed in our operations, program, and legislations to address these pollutants.

The United States Environmental Protection Agency (EPA) has the responsibility of overseeing the various programs necessary for the success of the Clean Water Act (CWA). However, administration and enforcement of such programs falls largely to the states. In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. Currently, there are four state agencies responsible for regulating activities that impact water quality with regard to this implementation plan. These agencies include: Virginia Department of Environmental Quality (VADEQ), Virginia Department of Conservation and Recreation (VADCR), Virginia Department of Agriculture and Consumer Services (VDACS), and Virginia Department of Health (VDH).

VADEQ has responsibility for monitoring the waters to determine compliance with state standard, and for requiring permitted point dischargers to maintain loads within permit limits. They have the regulatory authority to levy fines and take legal action against those in violation of permits. Beginning in 1994, animal waste from confined animal facilities in excess of 300 animal units (cattle and hogs) has been managed through a Virginia general pollution abatement permit. These operations are required to implement a number of practices to prevent groundwater contamination. In response to increasing demand from the public to develop new regulations dealing with animal waste, in 1999, the Virginia General Assembly passed legislation requiring VADEQ to develop regulations for the management of poultry waste in operations having more than 200 animal units of poultry (about 20,000 chickens), (ELI, 1999).

VADCR holds the responsibility for addressing nonpoint sources (NPS) of pollution. Most VADCR programs dealing with agricultural NPS pollution historically have been through education and voluntary

incentive programs. These cost-share programs were originally developed to meet the needs of voluntary partial participation and not the TMDL-required 100% participation of stakeholders. To meet the needs of the TMDL program and achieve the goals set forth in the CWA, the incentive programs must be reevaluated to account for 100% participation. It should be noted that VADCR does not have regulatory authority over the majority of NPS issues addressed here.
Through Virginia's Agricultural Stewardship Act, VDACS Commissioner of Agriculture has the authority to investigate claims that an agricultural producer is causing a water quality problem on a case-by-case basis (Pugh, 2001). If deemed a problem, the Commissioner can order the producer to submit an agricultural stewardship plan to the local soil and water conservation district. If a producer fails to implement the plan, corrective action can be taken which can include a civil penalty up to $5,000 per day. The Commissioner of Agriculture can issue an emergency corrective action if runoff is likely to endanger public health, animals, fish and aquatic life, public water supply, etc. An emergency order can shut down all or part of an agricultural activity and require specific stewardship measures. The Agricultural Stewardship Act is entirely complaint driven.

VDH is responsible for maintaining safe drinking water measured by standards set by EPA. Their duties also include septic system regulation and historically, regulation of biosolids land application. Like VDACS, VDH is complaint driven. Complaints can range from a vent pipe odor that is not an actual sewage violation and takes very little time to investigate, to a large discharge violation that may take many weeks or longer to effect compliance. In the scheme of these TMDLs, VDH has the responsibility of enforcing actions to correct or eliminate failed septic systems and straight pipes, respectively.

State government has the authority to establish state laws that control delivery of pollutants to local waters. Local governments in conjunction with the state can develop ordinances involving pollution prevention measures. In addition, citizens have the right to bring litigation against persons or groups of people who can be shown to be causing some harm to the claimant. Through hearing the claims of citizens in civil court, and the claims of government representatives in criminal court, the judicial branch of government also plays a significant role in the regulation of activities that impact water quality.

The Clean Water Act Section 303(d) calls for the identification of impaired waters. It also requires that the stream be ranked by the severity of the impairment and a Total Maximum Daily Load be calculated for that stream that would bring its water back into compliance with the set water quality standard. Currently, TMDL implementation plans are not required in the Federal Code however, Virginia State code does incorporate the development of implementation plans for impaired streams. The nonpoint source part of the Clean Water Act was largely ignored by EPA until citizens began to realize that regulating only point sources was no longer maintaining water quality standards. Beyond the initiation of the CWA, the entire TMDL program has been complaint driven. Lawsuits from citizens and environmental groups citing EPA was not carrying out the statutes of the CWA began as far back as the 1970's and have continued until the present. In the state of Virginia in 1998, the American Canoe Association and the American Littoral Society filed a complaint against EPA for failure to comply the provisions of §303d. The suit was settled by Consent Decree, which contained a TMDL development schedule through 2010. It is becoming more common for concerned citizens and environmental groups to turn to the courts for the enforcement of water quality issues.

Successful implementation depends on stakeholders taking responsibility for their role in the process. The primary role, of course, falls on the landowner. However, local, state and federal agencies also have a stake in seeing that Virginia's waters are clean and provide a healthy environment for its citizens. An important first step in correcting the existing water quality problem is recognizing that there is a problem and that the health of citizens, particularly those who are least able to protect themselves (*i.e.,* children), is at stake. While it is unreasonable to expect that the natural environment (*e.g.,* streams and rivers) can be made 100% free of risk to human health, it is possible and desirable to minimize manmade problems. Virginia's approach to correcting NPS pollution problems has been and continues to be encouragement of participation through education and financial incentives. However, if progress is not made toward restoring water quality using this voluntary approach, regulatory controls may be needed.

Final Public Meeting Presentation

Catoctin Creek TMDL

Implementation Plan

Development

June 24, 2004

Acknowledgements

Steering Committee Members
Working Group Members
&
Loudoun Soil & Water Conservation District
VADCR, VADEQ staff
Loudoun County Government staff

Total Maximum Daily Load

Maximum amount of pollutant that a water body can assimilate without surpassing state water quality standard.

Presentation Outline

1. Review of TMDL Development
2. Public Participation
3. Assessment of Needs
4. Cost/Benefit Analysis
5. Implementation

Catoctin Creek TMDL Summary

- All livestock excluded from streams
- All straight pipes identified and corrected
- Wildlife direct deposition reductions required
- Anthropogenic bacteria sources addressed first

Catoctin TMDL Summary (cont.)

Bacterial Source Tracking (BST) results

Impairment	Violations (> 1,000 cfu/100ml)	Human	Livestock	Wildlife
Upper South Fork	9 %	42 %	24 %	34 %
Lower South Fork	34 %	43 %	20 %	38 %
North Fork	50 %	50 %	25 %	25 %
Catoctin Creek	14 %	54 %	15 %	31 %

Public Participation

- Public Meetings
- Steering Committee Meetings
- Working Groups
  - Agricultural
  - Residential
  - Environmental
  - Governmental

Public Participation (cont.)

- Summary
  - Types of BMPs
  - Education and Technical Assistance
  - Concerns with participation
  - Funding
  - Timeline

Assessment of Needs

- Identification of BMPs
- Quantification of BMPs
  - Spatial Analysis
  - Input from LSWCD
  - BMP Database Analysis
- Technical Assistance and Education
  - Input from LSWCD

Assessment of Needs

Agricultural BMPs

- Livestock Exclusion
  - 81 miles of perennial streams
  - 32 miles of streamside fencing
  - 83 Full Livestock Exclusion Systems
  - 43 Horse Exclusion Systems
  - 76 Hardened Crossings

Assessment of Needs

Residential BMPs

- 20 Straight Pipes to be Corrected

Assessment of Needs

Technical Assistance

- Agricultural
  - LSWCD
  - 5 technical man-years
- Residential
  - VDH
  - 2.5 technical man-years

Estimated Total Cost

Agricultural BMPs	$913,000
Residential BMPs	$430,000
Technical Assistance	$375,000
TOTAL	$1.72 million

Livestock System

Water Source	$3,000 – $15,000
1,000 ft Streamside Fencing	$4,000 – $8,000
TOTAL	$7,000 – $23,000

Private Sewage System

Septic System Repair	$100 - $2,000
Septic System Replacement	$7,000
Alternative System	$9,000 – $36,000

Benefit Analysis

- Water Quality Benefits
  - Human Health
  - Environmental Benefit
- Economic Benefit
  - Local Economy & Community
  - Horse Owners/Boarders
  - Agricultural Producers
  - Homeowners

Funding Sources

- Many funding sources:
  - 319 Incremental Funding
  - EQIP
  - SE/R-CAP
  - VADEQ Agricultural Loan Program
  - VADEQ Small Business Loan Program

Funding Sources

Livestock System: Example Scenario 1

VA State Cost-Share Program:

System Cost	$7,000
Design Cost (LSWCD assistance)	$1,900
100% Assistance Funded (319 Incremental Funds)	-$1,900
75% Cost-Share	-$5,250
25% Tax Credit	-$438
Cost to Landowner	$1,312

Funding Sources

Livestock System: Example Scenario 2

If regulatory authority or court action forces participation:

System Cost	$7,000
Design Cost (LSWCD assistance)	$1,900
0% Assistance Funded (319 Incremental Funds)	-$0
0% Cost-Share	-$0
0% Tax Credit	-$0
Cost to Landowner	$ 8,900

Funding Sources

Residential Septic System: Example Scenario 1

VA State Cost-Share Program:

For Household with Moderate Income 60-80% of Statewide Median Income

System Cost	$7,000
60% Cost-Share	-$4,200
Cost to Landowner	$2,800

Funding Sources

Residential Septic System: Example Scenario 2

If regulatory authority or court action forces participation:

System Cost	$7,000
0% Cost-Share	-$0
Cost to Landowner	$7,000

Milestones

- Implementation Milestones
  - 20% of needed systems installed each year
- Water Quality Milestones
  - Determined through modeling
  - Monitoring

5-Year Timeline

Implementation and Technical Assistance

Year	Exclusion Systems (%)	Straight Pipes (%)	Ag. TA (FTE)	Res.TA (FTE)
1	20	20	1	0.5
2	20	20	1	0.5
3	20	20	1	0.5
4	20	20	1	0.5
5	20	20	1	0.5
TOTAL	100	100	5	2.5

5-Year Timeline

Cost ($ Thousands)

Year	Exclusion Systems ($)	Straight Pipes ($)	Ag. TA ($)	Res.TA ($)	Total ($)
1	182	86	50	25	344
2	182	86	50	25	344
3	182	86	50	25	344
4	182	86	50	25	344
5	182	86	50	25	344
TOTAL	913	430	250	125	1,718

Targeting

Agricultural

- Areas Selected Using Spatial Analysis
- Modeling
- Example: *50% livestock exclusion in North Fork Catoctin Creek*
  - *without* targeting: 26% violation of standard
  - *with* targeting: 16% violation of standard

Monitoring

- VADEQ
  - Currently funded
  - Ongoing
- Loudoun Watershed Watch (LWW)
  - Citizen based group
  - Bacteria and benthic monitoring
  - To document implementation progress

Education & Outreach

- LSWCD
  - Newsletter specific to farmers
  - One-on-one communication
- VDH
  - Operation and maintenance of septic systems
- VCE
  - Responds to specific needs of Virginia citizens
- LWW
  - E-mail newsletter
  - Displays at local events
  - Updated website
    www.loudounwatershedwatch.org

Stakeholder's Role in Implementation

- Participation
  - Watershed Residents
    - Loudoun Watershed Watch
  - Loudoun Soil and Water Conservation District
  - Loudoun County
  - VA Department of Conservation and Recreation
  - VA Department of Environmental Quality
  - VA Department of Health
  - VA Cooperative Extension
  - VA Department of Agricultural & Consumer Services
  - United States Environmental Protection Agency
  - USDA – Natural Resources Conservation Service

Contacts

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Notes

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